AF/2816

<u>Certificate Under 37 CFR 1.8(a)</u>

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Deanna L. Hasler

Deanna L. Hasler

#31 Appeal Brief J. McCuiller 11/24/03

10/16/03

Patent
<u>Case No. 11336/108 (P00042US)</u>

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Group Art Unit: 2816
Gerald R. Stanley	Examiner: T. Cunningham
Serial No.: 09/748,609	
Filed: December 26, 2000	
For: ACTIVE ISOLATED-INTEGRATOR LOW-PASS FILTER WITH ATTENUATION POLES	

<u>REQUEST FOR REINSTATEMENT OF APPEAL PURSUANT TO 37 CFR § 1.193(b)(2)(ii)</u>

MAIL STOP APPEAL BRIEF PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

On June 12, 2003, Appellant filed an Appeal Brief in response to the Final Office Action mailed on December 23, 2002. In response to Appellant's Appeal Brief, prosecution of the above-mentioned application was reopened in an Office Action mailed on July 17, 2003. Pursuant to 37 CFR § 1.193(b)(2)(ii), Appellant responds to the July 17, 2003, Office Action by hereby requesting reinstatement of the Appeal and by filing concurrently with this paper Appellant's Supplemental Appeal Brief in triplicate. Since Appellant previously paid the Appeal Brief fee on June 12, 2003, Appellant believes that no further fees are required for

this Appeal. If further fees or extensions of time are required, the undersigned authorizes that his firm's Deposit Account No. 23-1925 may be charged for the fees due. A duplicate copy of this paper is enclosed.

Respectfully submitted,

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PATENT
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SUPPLEMENTAL APPEAL BRIEF

MAIL STOP APPEAL BRIEF-PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

This Supplemental Appeal accompanies a Request for Reinstatement of Appeal and is in response to the Non-Final Office Action mailed July 17, 2003. A Notice of Appeal and the required fee were filed on March 21, 2003. An Appeal Brief and required fee were filed on June 12, 2003.

TABLE OF CONTENTS

I. Real Party In Interest

Harman International Industries, Incorporated is the real party in interest.

II. Related Appeals And Interferences

The undersigned is unaware of any other appeals or interferences that will directly affect, or be directly affected by, or have a bearing on the Board's decision in the pending appeal.

III. Status Of Claims

Claims 1-6 and 9-21 are pending. Claims 1-6 and 9-21 stand rejected pursuant to 35 U.S.C. § 112, second paragraph. In addition, claims 9-12 stand rejected pursuant to 35 U.S.C. § 112, first paragraph. Further, Claims 1, 2, 4, 5, 13-18, 20 and 21 stand rejected pursuant to 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,635,871 to Cavigelli in view of Applicant's prior art FIG. 1. Claims 1-6 and 9-21 are the subject of this appeal. The current state of Claims 1-21 are included in the Appendix.

IV. Status Of Amendments

Amendments by the Applicant filed with an After Final Office Action Response mailed on February 19, 2003 were not entered by the Examiner, and are one subject of this appeal. See Section IV Status of Amendments in the Appeal Brief filed on June 12, 2003 which is herein incorporated by reference.

V. Summary Of Invention

As disclosed on pages 2-9 of the specification, the invention involves the inclusion of an isolated-integrator band-reject filter (20) into an active low-pass filter system. As illustrated in Figures 2 and 4, the active low-pass filter system comprises a low-pass filter circuit (22, 24, 26, 28, 30) and an isolated-integrator band-reject filter (20).

The low-pass filter circuit (22, 24, 26, 28, 30) includes a resistive forward signal flow branch. The low-pass filter circuit may be a Sallen & Key filter, a multiple feedback filter, a

state variable filter, or any other form of second order or higher active low-pass filter design. The isolated-integrator band-reject filter (20) is imbedded within the low-pass filter circuit (22, 24, 26, 28, 30).

The isolated-integrator band-reject filter (20) forms part of the resistive forward signal flow branch of the low-pass filter circuit (22, 24, 26, 28, 30). Accordingly, the isolated-integrator band-reject filter (20) is incorporated into the low-pass filter circuit (22, 24, 26, 28, 30) between an input terminal and an output terminal of the low-pass filter circuit (22, 24, 26, 28, 30). The isolated-integrator band-reject filter (20) includes three capacitors (C2, C4) of equal value, two resistors (R2, R6) of equal value and a tuning resistor (R3, R7) for tuning.

As illustrated in Figures 5 and 6, a power amplifier system (40) for driving a load (45) is also disclosed. The power amplifier system (40) includes a pulse width modulation circuit (42), an error amplifier and modulator circuit (43), a demodulation filter (47) and a feedback control loop. The error amplifier and modulator circuit (43) is connected to an input of the pulse width modulation circuit (42) and the demodulation filter (47) is connected to an output of the pulse width modulation circuit (42). The feedback control loop is connected to the error amplifier and modulator circuit (43) and the output of the pulse width modulation circuit (42). The feedback control loop includes a feedback demodulation filter (44). An isolated-integrator band-reject filter (20) is imbedded within the feedback demodulation filter (44).

VI. Issues

There are five issues presented in this appeal: (1) whether Claims 1-6 and 9-21 are indefinite pursuant to 35 U.S.C. § 112, second paragraph and are therefore unpatentable due to use of the phrase "isolated-integrator band-reject filter"; (2) whether Claims 9-12 are unpatentable pursuant to 35 U.S.C. § 112, first paragraph as being based on a non-enabling disclosure; (3) whether claims 1, 2, 4-5, 13-18, 20 and 21 are unpatentable pursuant to 35 U.S.C. § 103(a) by US Patent No. 5,635,871 to Cavigelli entitled "Low Phase Error

Amplifying" (hereafter, "Cavigelli") in view of Applicant's prior art Fig. 1; (4) whether the proposed paragraph immediately following paragraph 46 in the Description of the Present Invention that was requested to be entered in Applicant's Office Action Response mailed on November 8, 2002 constitutes new matter; and (5) whether proposed new amended Figure 6 that was requested to be entered in Applicant's After-Final Office Action Response mailed on February 19, 2003 constitutes new matter.

VII. Grouping Of Claims

35 U.S.C. § 103(a) Grounds For Rejection

Claims 1, 2, 4-5, 13-18 and 20-21 do not stand or fall together. Accordingly, Applicant identifies the grouping of the Claims as follows:

Group I:	Claims 1, 2, 4, 13, 14, 15, 18, 20
Group II:	Claims 16, 17
Group III:	Claims 5, 21

VIII. Arguments

A. The 35 U.S.C. § 112, Second Paragraph Grounds for Rejection of Claims 1-6 and 9-21

1. The Statutory Standard

35 U.S.C. § 112, Second Paragraph provides:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

"The definiteness of the language employed must be analyzed - not in a vacuum, but in light of the teachings of the prior art and of the particular application disclosure as it would be interpreted by one possessing the ordinary level of skill in the pertinent art." *In re Moore,* 439 F.2d 1232, 1235 (CCPA 1971).

2. The term "isolated-integrator band-reject filter" has plain meaning to those skilled in the art

The Examiner has asserted that the meaning of the phrase "isolated-integrator band-reject filter" is not defined by the specification. Applicant has previously provided the affidavit of Mr. James Wordinger as part of the Office Action Response mailed February 19, 2003 and as Exhibit 2 of the Appeal Brief filed June 12, 2003, which is herein incorporated by reference. Mr. James Wordinger is an electrical engineer with 24 years of experience in the field of electronics, electrical circuit design and electrical circuit operation related to electronic filters and audio power amplifier systems. Mr. James Wordinger is familiar with the general knowledge and experience of those skilled in the art of filters and audio power amplifier systems. Mr. James Wordinger has confirmed that the term "isolated integrator" has a plain meaning to those with an ordinary level of skill in the pertinent art. Applicant has also discussed the term "isolated integrator" at length in section VIII.C.1.(a) of the Appeal Brief filed June 12, 2003 which is herein incorporated by reference along with all referenced attachments and exhibits. Accordingly, the term "isolated integrator" has a plain meaning to those with skill in the art.

The term "band-reject filter" also has plain meaning to those with an ordinary level of skill in the pertinent art. A band-reject filter is "a circuit or device that blocks signals within a specific range (band) of frequencies, while passing signals at frequencies outside that band." (*The Illustrated Dictionary of Electronics*, p.61 (7^{th} ed., 1997) (attached as Exhibit 1)). Thus, the phrase "isolated-integrator band-reject filter" has plain meaning to those skilled in the art. Applicants respectfully request removal of the rejection of Claims 1-6 and 9-21 pursuant to 35 U.S.C. § 112, second paragraph.

B. The 35 U.S.C. § 112, First Paragraph Grounds for Rejection of Claims 9-12

1. The Statutory Standard

35 U.S.C. § 112, First Paragraph provides:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

A determination of whether a claim is supported by the disclosure of an application is based on whether the disclosure includes sufficient information to enable one skilled in the art to make and use the claimed invention. *MPEP 2164.01*. The standard for making this determination is based on whether any person skilled in the art can make and use the invention without undue experimentation. *Id.* "A patent need not teach, and preferably omits, what is well known in the art." *Id.*

2. Claims 9-12 are based on a disclosure that is enabling

The Examiner has asserted that Claims 9-12 are based on a disclosure that is non-enabling pursuant to 35 U.S.C. § 112, first paragraph. This issue has been previously discussed in Section VIII.C.2 of the Appeal Brief filed June 12, 2003 which is herein incorporated by reference along with all referenced attachments and exhibits.

C. The 35 U.S.C. § 103(a) Grounds for Rejection of Claims 1, 2, 4, 5, 13-18, 20 and 21.

1. The Statutory Standard

35 U.S.C. § 103(a) provides:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Establishment of a *prima facie* case of obviousness requires: 1) there be some suggestion of motivation to modify a reference, 2) there must be a reasonable expectation of success, and 3) the prior art reference must teach or suggest all the claim limitations. *MPEP 706.02(j)*. (Two factors involved in proper analysis pursuant to § 103 are "(1) whether the prior art would have suggested to those of ordinary skill in the art that they should make the claimed composition or device, or carry out the claimed process; and (2) whether the prior art would also have revealed that in so making or carrying out, those of ordinary skill would have a reasonable expectation of success." *In re Vaeck,* 947 F.2d 488 (Fed. Cir. 1991). The suggestion and reasonable expectation must both be found in the prior art, not the disclosure of applicants' specification. *Id.*

2. Overview Of Cavigelli

Figures 1 and 12a of Cavigelli discloses an amplifier system with three low-pass amplifier stages (7, 13 and 19) cascaded together. Each of the amplifier stages is arranged to form a low pass filter. (Col. 3 lines 1-2) Cascaded with the amplifier stages is a notch filter (202) as illustrated in Fig. 12a. (Col. 8 lines 58-62) The notch filter provides filtering in a determined range of frequencies that are substantially above the operating frequencies of the amplifier system. (Col. 8, lines 63-66) The notch filter may therefore eliminate high frequency noise caused by other sources, but does not affect the forward gain and the phase of the amplifier system except in a notch frequency region.

3. Groups I-III (Claims 1, 2, 4-5, 13-18, 20 and 21) Are Patentable Over Cavigelli in view of prior art Fig. 1 of Applicant's specification

a. *Group I (Claims 1, 2, 4, 13, 18 and 20) is Patentable Over Cavigelli in view of Prior Art Fig. 1 of Applicant's specification*

Group I includes Claims 1 and 13. Claim 1 discloses an active low-pass filter system that includes a low-pass filter circuit and an isolated-integrator band-reject filter. The low-pass filter circuit includes a resistive forward signal flow branch. The isolated-integrator

band-reject filter is embedded in the low-pass filter circuit to form part of the resistive forward signal flow branch. Claim 13 discloses an active low-pass filter system that includes a low-pass filter circuit having an input terminal and an output terminal. The active low-pass filter system also includes an isolated-integrator band-reject filter that is incorporated into the low-pass filter circuit between the input terminal and the output terminal.

The Examiner has asserted that the amplifier system of Figures 1 and 12(a) of Cavigelli is a low-pass filter circuit and that it would have been obvious to one skilled in the art to use the isolated-integrator band-reject filter in Applicant's prior art Fig. 1 for the notch filter 202. Applicant respectfully disagrees.

Cavigelli teaches that the amplifier system may be used to amplify a signal without creating phase shift error. The amplifier system uses three cascaded amplifiers each with a local feedback loop and a global feedback loop for the cascaded amplifiers to provide a low phase error amplifier. (Col. 3, lines 48-59) The local feedback loops control the forward gain of the amplifier system and the global feedback loop (that includes resistor (38)) governs the closed loop gain of the amplifier system. (Col. 4, lines 11-16) As illustrated in FIG. 1 of Cavigelli each of the three amplifiers is an active stage that includes a low impedance output providing a voltage source to drive the subsequent stage. The last cascaded amplifier (19) drives the notch filter (202) as illustrated in Fig. 12a.

Few details regarding the internal configuration of the notch filter are disclosed by Cavigelli. However, Cavigelli does teach that the "notch filter 202 does not affect the forward gain and the phase of the apparatus except in the notch frequency region." (Col. 8, lines 62-64) As would be understood by those skilled in the art, to avoid affecting the forward gain and the phase, the notch filter taught by Cavigelli <u>must</u> provide a buffered output having low output impedance (as is the case for each of the cascaded amplifiers taught by Cavigelli). In addition, those skilled in the art would recognize that the notch filter should

be an active stage that is capable of producing an output voltage to drive the output (Vout) and the global feedback loop similar to each of the cascaded amplifiers taught by Cavigelli.

These requirements are evidenced in Fig. 1 of Cavigelli by the third cascaded amplifier (19) depicted as an active stage with a buffered output that is driving the output (Vout) and the global feedback loop. As would be recognized by those skilled in the art, if the notch filter of Cavigelli had a high output impedance, the load would affect the output voltage (Vout) and the low phase error taught by Cavigelli would not be achievable. Cavigelli therefore teaches that the notch filter should not include significant insertion losses.

Clearly, the isolated-integrator band-reject filter is a passive filter circuit that does not provide a buffered output, and thus is capable of high output impedance. Cavigelli, however, teaches away from use of a passive filter without a buffered output for the notch filter because the low phase error taught by Cavigelli is not achievable with a notch filter capable of high output impedance. In fact, Cavigelli teaches away from using any form of RC passive notch filter because those skilled in the art would understand that such a filter would result in losses that affect the forward gain and phase of the amplifier system in <u>all regions</u>, not just the notch frequency region. Combination of references is improper where the references teach away from their combination. *In re Grasselli,* 713 F.2d 731, 743 (Fed. Cir. 1983).

In addition, there is no suggestion or motivation to use the isolated-integrator band-reject filter as the notch filter taught by Cavigelli. In fact, use of the isolated-integrator band-reject filter would render the amplifier system taught by Cavigelli unsatisfactory for amplifying a signal without creating phase error. As would be recognized by those skilled in the art, the load fed by the output of the Cavigelli amplifying system <u>would</u> detrimentally affect the output voltage (Vout) if the isolated-integrator band-reject filter (that has a non-buffered output) was included as the Cavigelli notch filter. Accordingly, the global feedback loop would not be capable of the intended purpose of controlling phase shift to minimize the

phase error of an amplified signal. There is no suggestion or motivation to make a proposed modification if the invention is made unsatisfactory for its intended purpose by incorporating the proposed modification. *In re Gordon,* 733 F.2d 900 (Fed. Cir. 1984).

Combination of the amplifying system taught by Cavigelli and the isolated-integrator band-reject filter <u>would require</u> alteration of a basic principal of operation of the Cavigelli amplifier system. As previously discussed, the amplifier system taught by Cavigelli requires that the notch filter is an actively buffered isolated stage driving a load and the global feedback loop to actively control phase error. Inclusion of the isolated-integrator band-reject filter as the notch filter of Cavigelli inserts a passive device capable of high output impedance that is responsive to the load being supplied by the output voltage (Vout). Thus, substantial reconstruction and redesign affecting the basic operating principal of the feedback control of the Cavigelli amplifier system would be required. Where the principal of operation of the prior art invention is altered by a modification suggested by another prior art reference, a *prima facie* case of obviousness has not been established. *In re Ratti,* 270 F.2D 810, 813 (CCPA 1959).

Accordingly, for at least the foregoing reasons, Applicant respectfully requests removal of the 35 U.S.C. § 103(a) rejection of Claims 1 and 13. Dependent claims 2, 4 and 18, 20 depend from independent Claims 1 and 13, respectively, and are therefore patentable over Cavigelli in view of Applicant's prior art FIG. 1 for at least the same reasons.

b. Group II (Claims 16 and 17) is Patentable Over Cavigelli

Group II contains Claims 16 and 17. Claims 16 and 17 depend from Claim 13. Claims 16 and 17 are therefore patentable over Cavigelli in view of Applicant's prior art Fig. 1 for at least the reasons given above in conjunction with Group I. In addition, Claims 16 and 17 are separately patentable. Claim 16 discloses the additional features of a first resistor and a second resistor with an isolated-integrator band-reject filter electrically connected

therebetween. Claim 17 discloses the limitation that one of the resistors of Claim 16 has a resistive value of zero. The notch filter of Cavigelli disclosed in Figure 12a is electrically connected between an operational amplifier (A3) in the third stage (19) (see Fig. 1) and an output Vout (36) not a first and second resistor as in Claim 16. Clearly, Cavigelli does not teach or suggest the feature that the notch filter is electrically connected between a first and second resistor as disclosed by Claim 16. Cavigelli also does not teach or suggest that one of the first and second resistors is zero impedance as disclosed by Claim 17. Applicant's prior art Fig. 1 depicts only the isolated-integrator band-reject filter. Accordingly, Claims 16 and 17 each have separate, additional, independent reasons establishing patentability over Cavigelli and Applicant's prior art Fig. 1.

c. Group III (Claims 5 and 21) is Patentable Over Cavigelli

Group III contains Claims 5 and 21. Because Claims 5 and 21 are dependent from Claims 1 and 13 respectively, Claims 5 and 21 are patentable for at least the reasons given above in conjunction with Group I. In addition, these claims are separately patentable over Cavigelli in view of Applicant's prior art Fig. 1 because Claims 5 and 21 both disclose the further feature that the low-pass filter circuit is a state variable filter. Cavigelli, on the other hand, teaches only that the cascaded low-pass amplifying stages provide zero phase error by phase shifting the output of the stages. Applicant's prior art Fig. 1 depicts only the isolated-integrator band-reject filter. As known to those skilled in the art, filters based on analog computer structures derived from the state-variable representation of linear continuous systems are referred to as state-variable filters. Neither Cavigelli nor Applicant's prior art Fig. 1 teach or suggest a low-pass filter circuit that is a state-variable filter. Accordingly, Claims 5 and 21 each have separate, additional, independent reasons establishing patentability over Cavigelli in view of Applicant's prior art Fig. 1.

D. Copying Paragraph 3 On Page 11 Into The Detailed Description Did Not Add New Matter

Applicant has amended the specification by copying verbatim the language of paragraph 3 on page 11 to the detailed description section of the specification. The Examiner has objected to this paragraph as new matter. This issue has been previously discussed in Section VIII.C.2.b of the Appeal Brief filed June 12, 2003 which is herein incorporated by reference including all referenced attachments and exhibits.

E. Proposed New Amended Figure 6 Is Not New Matter

Amended new Figure 6 was added pursuant to 37 CFR § 1.83(a) to simply illustrate the elements described in paragraph 3 on page 11 of the specification and hence Claims 9-12. This issue has been previously discussed in Section VIII.C.2.c of the Appeal Brief filed June 12, 2003 which is herein incorporated by reference including all referenced attachments and exhibits.

F. Conclusion

In summary, the 35 U.S.C. § 112, second paragraph rejection of Claims 1-6 and 9-21 should be overturned because the term "isolated-integrator band-reject filter" has a plain meaning to those of ordinary skill in the art. The 35 U.S.C. § 112, first paragraph rejection of claims 9-12 should be overturned because claims 9-12 are enabled by the specification as evidenced by the declaration of Mr. James Wordinger. The 35 U.S.C. § 103(a) rejections of the claims of Groups I-III based on Cavigelli in view of Applicant's prior art Fig. 1 also should be overturned. The combination of Cavigelli and Applicant's prior art Fig. 1 do not render obvious the invention disclosed by the claims of Groups I-III because Cavigelli teaches away from the use of the circuit of prior art Fig. 1. In addition, the Cavigelli amplifier system is made unsatisfactory for its intended purpose by incorporating the circuit of prior art Fig. 1. Further, use of the circuit of prior art Fig. 1 in Cavigelli would require alteration in a basic principal of operation of the Cavigelli amplifier system. The additional paragraph and Figure

6 are not new matter since they are both supported by the specification and should be entered, as further evidenced by the declaration of Mr. James Wordinger.

Dated: October 16, 2003

Respectfully submitted,

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Attachment: Exhibit 1

IX. Appendix

1. (Previously Amended) An active low-pass filter system including:

a low-pass filter circuit including a resistive forward signal flow branch; and

an isolated-integrator band-reject filter imbedded within the low-pass filter circuit, wherein the isolated-integrator band-reject filter forms part of the resistive forward signal flow branch.

2. (Original) The system of Claim 1, wherein the band-reject filter includes a resistor for tuning the band-reject filter.

3. (Previously Amended) The system of Claim 1, wherein the low-pass filter circuit includes a Sallen & Key filter.

4. (Original) The system of Claim 1, wherein the low-pass filter circuit is a multiple feedback filter.

5. (Original) The system of Claim 1, wherein the low-pass filter circuit is a state variable filter.

6. (Previously Amended) A power amplifier system for driving a load comprising:

a pulse width modulation power circuit creating ripple spectra;

an error amplifier and modulator circuit connected to an input of the pulse width modulation power circuit;

a demodulation filter connected between said pulse width modulation power circuit and the load;

a feedback control loop coupled to said error amplifier and modulator circuit and including:

an active low-pass filter;

a first resistive voltage divider circuit coupled between the output of said demodulation filter and a first input of said low-pass filter;

a feedback demodulation filter coupled to a second input of said low-pass filter and including at least one isolated-integrator band-reject filter; and

a second resistive voltage divider circuit coupled between the output of said pulse width modulation power circuit and said feedback demodulation filter.

7. (Cancelled)

8. (Cancelled)

9. (Previously Added) A power amplifier system for driving a load comprising:

a pulse width modulation power circuit having an input and an output;

an error amplifier and modulator circuit connected to the input of the pulse width modulation power circuit;

a demodulation filter connected to the output of the pulse width modulation power circuit;

a feedback control loop coupled to the error amplifier and modulator circuit and to the output of the pulse width modulation power circuit, the feedback control loop including a feedback demodulation filter, wherein an isolated-integrator band-reject filter is imbedded within the feedback demodulation filter.

10. (Previously Added) The system of claim 9, wherein the isolated-integrator band-reject filter includes a variable resistor for tuning the isolated-integrator band-reject filter.

11. (Previously Added) The system of claim 9, wherein the feedback demodulation filter is operable as a low-pass filter to remove pulse width modulated spectra from the feedback control loop, the pulse width modulated spectra produced by the pulse width modulation power circuit.

12. (Previously Added) The system of claim 9, wherein the feedback demodulation filter includes a resistive forward signal flow branch, the isolated-integrator band-reject filter being electrically connected within the resistive forward signal flow branch.

13. (Previously Added) An active low-pass filter system comprising:

a low-pass filter circuit having an input terminal and an output terminal; and

an isolated-integrator band-reject filter incorporated into the low-pass filter circuit between the input terminal and the output terminal.

14. (Previously Added) The active low-pass filter system of claim 13, wherein the low-pass filter circuit includes a resistive forward signal flow branch between the input terminal and the output terminal, the isolated-integrator band-reject filter incorporated into the resistive forward signal flow branch.

15. (Previously Added) The active low-pass filter system of claim 13, wherein the active low-pass filter system is at least a second order system.

16. (Previously Added) The active low-pass filter system of claim 13, wherein the low-pass filter circuit includes a first resistor and a second resistor, the isolated-integrator band-reject filter electrically connected between the first and second resistors.

17. (Previously Added) The active low-pass filter system of claim 16, wherein at least one of the first and second resistors has a resistive value of zero.

18. (Previously Added) The active low-pass filter system of claim 13, wherein the isolated-integrator band-reject filter includes at least three capacitors with equal value and at least two resistors with equal value.

19. (Previously Added) The active low-pass filter system of claim 13, wherein the low-pass filter circuit includes a Sallen & Key filter.

20. (Previously Added) The active low-pass filter system of claim 13, wherein the low-pass filter circuit includes a multiple feedback filter.

21. (Previously Added) The active low-pass filter system of claim 13, wherein the low-pass filter circuit includes a state variable filter.

EXHIBIT 1

The Illustrated Dictionary of Electronics

Seventh Edition

Stan Gibilisco
Editor-in-Chief

McGraw-Hill
New York San Francisco Washington, D.C. Auckland Bogotá
Caracas Lisbon London Madrid Mexico City Milan
Montreal New Delhi San Juan Singapore
Sydney Tokyo Toronto

Library of Congress Cataloging-in-Publicati n Data

Gibilisco, Stan.
The illustrated dictionary of electronics / Stan Gibilisco.—7th ed.
p. cm.
ISBN 0-07-024186-4 (pbk.)
1. Electronics—Dictionaries. I. Title.
TK7804.G497 1997
621.381'03—dc21 97-9081
CIP

McGraw-Hill
A Division of The McGraw-Hill Companies

1 2 3 4 5 6 7 8 9 0 FGR/FGR 9 0 2 1 0 9 8 7

ISBN 0-07-024186-4

The sponsoring editor for this book was Scott Grillo, and the production supervisor was Pamela Pelton. It was set in Bookman by Lisa Mellott through the services of Barry E. Brown (Broker—Editing, Design and Production).

Printed and bound by Quebecor/Fairfield.

transmits ac energy with negligible loss. **2.** The ability to allow passage of signals at a given frequency or band of frequencies while blocking other signals. Compare BANDSTOP.

bandpass amplifier An amplifier that is tuned to pass only those frequencies between preset limits.

bandpass coupling A coupling circuit with a flat-topped frequency response so that a band of frequencies, rather than a single frequency, is coupled into a succeeding circuit. Also see BANDPASS, **1.**

bandpass filter A filter designed to transmit a specific band of frequencies with negligible loss while rejecting all other frequencies. Compare BAND-REJECTION FILTER.

bandpass flatness The degree to which a bandpass device's attenuation-versus-frequency curve is a straight line with zero slope within the passband.

band pressure level The net acoustic pressure of a sound source within a specified frequency range (band).

band-rejection filter Also called *bandstop filter*. A circuit or device that blocks signals within a specific range (band) of frequencies, while passing signals at frequencies outside that band.

band selector Any switch or relay that facilitates switching the frequency of a radio transmitter, receiver, or transceiver among various bands.

bandset capacitor In some older communications receivers, a variable capacitor is used to preset the tuning range in each band to correspond to graduations on the tuning dial. This capacitor is a trimmer or padder operated in conjunction with the main tuning capacitor.

bandspreading In some older communications receivers, the process of widening the tuning range within a given frequency band to cover the entire dial. Otherwise, the band would occupy only a portion of the dial, and tuning would be difficult. It is usually accomplished with a BANDSPREAD TUNING CONTROL whose range is preset via the main tuning control and/or a BANDSET CAPACITOR.

bandspread tuning control An analog adjustment in some older communications receivers that allows continuous tuning over a desired band of frequencies. This control is separate from the main tuning control.

bandstop **1.** The frequency limits between which a BAND-REJECTION FILTER blocks, or greatly attenuates, ac energy. **2.** The ability to suppress or block signals of a given frequency or band of frequencies, while allowing signals of other frequencies to pass with little or no attenuation. Compare BANDPASS.

bandstop filter See BAND-REJECTION FILTER.

band suppression **1.** The property of blocking, or greatly attenuating, signals within a specific frequency band. **2.** The frequency limits between which a device or circuit rejects or blocks ac energy, while passing energy at other frequencies with negligible loss.

band-suppression filter See BAND-REJECTION FILTER.

bandswitch A low-reactance selector switch (usually rotary) that facilitates changing the tuning range of a radio receiver, transmitter or transceiver from one band of frequencies to another.

bandswitching In a receiver, transmitter, or test instrument, the process of switching self-contained tuned circuits to change from one frequency spectrum to another within the range of the device's intended operation.

bandwidth **1.** For a communications or data signal, a measure of the amount of spectrum space the signal occupies. Usually, it is given as the difference between the frequencies at which the signal amplitude is nominally 3 dB down with respect to the amplitude at the center frequency. These frequencies represent the half-power points of the amplitude-versus-frequency function. In general, the bandwidth increases as the data rate (in bits per second, baud, or words per minute) increases. **2.** Also called NECESSARY BANDWIDTH. The minimum amount of spectrum space normally required for effective transmission and reception of a communications or data signal. **3.** See BANDPASS, **1.**

bank A collection of usually similar components used in conjunction with each other, usually in a parallel configuration. Some examples are resistor bank, lamp bank, and transformer bank.

banked transformers Parallel-operated transformers.

bankwound coil A coil wound in such a way that most of its turns are not side by side, thus reducing the inherent distributed capacitance.

bar **1.** Abbreviation, b. The cgs unit of pressure, in which 1 b = 10^5 pascals per square centimeter. **2.** A horizontal or vertical line produced on a television (TV) screen by a bar generator and used to check linearity. **3.** A thick plate of piezoelectric crystal. **4.** A solid metal conductor, usually uninsulated, of any cross section. **5.** A silicon ingot from which semiconductor devices can be fabricated.

BAR Abbreviation of BUFFER ADDRESS REGISTER.

bar code A printed pattern that contains data that can be recovered by laser scanning. It is commonly used for the pricing and identification of store merchandise. It can also be used by an assembly or maintenance robot as an aid to identifying tools.

bar-code reader A laser scanning device that recovers the data from a tag that contains a BAR CODE. The laser beam moves across the tag. The beam is reflected from the white regions between the lines, but is absorbed by the dark